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(54) Title: TOOTHBRUSH WITH VIBRATING HEAD PART

//graphic//

(57) Abstract (in English)

TOOTHBRUSH WITH VIBRATING HEAD PART

The invention concerns a toothbrush according to the preamble of Claim 1.

Nowadays either ordinary manual toothbrushes or electric toothbrushes in which a moving brush head can be driven by a motor from the handle are used for tooth cleaning. A more intensive cleaning effect is generally achieved with the latter than with manual toothbrushes, but they exhibit the shortcoming that they are relatively bulky and expensive, injure the gums and can cause serious abrasion of the enamel.

The underlying task of the invention is to devise a cost-effective toothbrush that corresponds in size roughly to an ordinary manual toothbrush but permits improved cleaning effects.

This task is solved according to the invention by a toothbrush with the features of Claim 1.

Owing to the fact that a mechanical vibration device that vibrates the head part is accommodated in a front head part of the toothbrush or in a region of the neck part that connects the head part to the handle and adjoins the head part, which is effectively connected to a power supply accommodated in the handle via electrical connections passing through the neck part, in which vibration-damping means are provided to prevent vibration transfer to the handle, a situation is achieved in which the vibrations that cause the improved cleaning effect primarily occur in the head part and are only slightly sensed in the handle, so that comfortable handling of the toothbrush is achieved. Another advantage of the toothbrush according to the invention consists of the fact that because of the flexible neck part no mechanical drive device need be guided to the vibration device. Only the electrical connections designed as wires, cables or electrically conducting plastic tracks run through the neck part.

Preferred modifications of the toothbrush according to the invention form the object of the dependent claims.

The invention is now further explained with reference to the drawing.

In the drawing:

Figure 1 schematically depicts in a side view and partially in section a first practical example of a toothbrush according to the invention and a handle closure part separated from each other (without battery);

Figure 2 shows in a bottom view and partially in section a second practical example of a toothbrush according to the invention in the assembled state;

Figure 3 shows in a side view and partially in section a toothbrush according to Figure 2 and the closure part separated from each other (without battery);

Figure 4 shows in a side view a third practical example of a toothbrush according to the invention in the assembled state; and

Figure 5 shows a front part of the toothbrush according to Figure 4 with different variants of replaceable treatment heads.

Both the toothbrush depicted in Figure 1 and those according to Figures 2 and 3 each have a handle 1, a front, bristle-carrying head part 3 and a neck part 4 that connects the head part 3 to handle 1. The bristles combined into bristle brushes 6 are anchored in a bristle support 5 and form an optionally profiled brush surface with their free end. In the depicted variant the bristle carrier 5 with the bristle brushes 6 is replaceably positioned on a neck part 2 of head part 3 in a manner known and therefore not further described.

The neck part 4 is provided with neck part zones 7 made of an elastically compliant material component that produces or additionally increases the elasticity of neck part 4 so that the bristle-carrying head part 3 can be forced back elastically under the influence of forces in a direction against the brush surface during use of the toothbrush. The neck part zones 7 are optionally designed as notches filled with an elastically compliant material (for example, with a thermoplastic elastomer) that extends over part of the periphery of the neck. A different shape and number of neck part zones would naturally be quite conceivable. A flexible neck zone without using elastic material components is also conceivable, for example, by constrictions or by a bellows.

A mechanical vibration device 10 is integrated in the front head part 3 or in the region of the neck part adjoining head part 3, by means of which the vibrations that cause tooth cleaning or intensify it can be imparted to the bristle-carrying head part 3. The vibration device 10 can be connected to an electrical power supply accommodated in handle 1 via electrical connections passing through neck part 4, as is described subsequently. The already mentioned neck part

zones 7 made of elastically compliant material then act as the means that dampen the vibrations between the vibrating end part 3 and handle 1 so that the vibration effect primarily occurs in the head part and is only slightly transferred to handle 1. This means that during the tooth cleaning process, only slight vibrations can be sensed in handle 1 and handling of the toothbrush is convenient on this account. However, in another sense it is also advantageous that the generated vibration is not dampened by handle 1 and can act fully in head part 3. However, other vibration-damping means would be conceivable instead of the neck part zone 7 consisting of an elastically compliant material; an elastic material need not necessarily be used. Damping can also be achieved using a base material by special shaping of the neck part, for example, by the presence of a bellows/concertina part, etc.

A capsule or sleeve 20 made of electrically conducting material that extends in the longitudinal direction is accommodated in handle 1. Both handle 1 and sleeve 20 are open to the rear so that a cavity 21 that can be closed from the rear by a closure part 22 is formed, into which a battery 25, in the depicted practical example an ordinary nonrechargeable pin-type battery with a defined power (for example, 1.5 V), can be introduced as power supply for the vibration device 10. However, a button battery or rechargeable battery cell could also be used as power supply.

A spring contact 29 for the plus pole 30 of battery 25 (cf. Figure 2) is placed on a transverse wall 28 in sleeve 20, which is connected to the vibration device 10 via an electrical line 31, a switch 32 incorporated in sleeve 20 and operable from the outside of handle 1, and an electrical line 33 running in the neck part 4. The electrical connection can be interrupted by means of switch 32.

The closure part 22 is equipped with a threaded pin 22a made of an electrically conducting material and can be screwed with this into handle 1 or into sleeve 20. The threaded pin 22a is provided with a contact surface 22b, which comes in contact with the minus pole 35 of the battery 25 inserted in sleeve 20 when the closure part 22 is screwed in. The electrical connection of the minus pole 35 to the vibration device 10 occurs via the threaded pin 22a, sleeve 22 itself and a line 34 running through neck part 4 that connects sleeve 20 to the vibration device 10.

Current transfer could also occur differently, for example, using wires or an electrically conducting plastic, instead of by means of the electrically conducting sleeve 20.

In the practical example depicted in Figure 1, the vibration device 10 comprises a vibration element 11' that preferably functions in the manner of a vibration armature, which can be electrically connected directly to the power supply via line 33, 34 and is placed in vibration when the power supply is connected.

The vibration device 10 in the toothbrush variants depicted in Figures 2 and 3 consists of a vibration element 11 in the form of an eccentric that can be rotated around an axis lying in the longitudinal direction of the toothbrush and a drive designed as micromotor 15 arranged directly adjacent to it. The vibration element 11 is connected to the shaft 15a of the micromotor 15 which can be electrically connected to the power supply via lines 33, 34. The micromotor 15 and the eccentric can be accommodated as a component in a housing 12.

Instead of a rotationally drivable eccentric, a vibration element 11 that can be driven in translatory fashion can also be considered.

It would be possible in the toothbrush according to the invention to arrange the bristle-carrying head part 3 mobile relative to the neck part 4 in order to place this in motion relative to the rest of the toothbrush by means of the vibrations produced by the vibration device 10.

The electrical lines 31, 33, 34 could also be implemented with plastic tracks that conduct electricity.

The switch 32 that connects or interrupts lines 31 and 33 can also involve a magnetic switch.

However, the preferred embodiment of switch 32 involves a pulse switch arranged on a printed circuit and additional electronic components that store the switching state.

The electrical connection between battery 25 and vibration element 11' (Figure 1) or drive 15 (Figure 2 and 3), however, can be also be produced or interrupted by rotating a closure part 22 that can be screwed into handle 1 or sleeve 20 or connected in bayonet fashion to it, instead of by means of switch 32 (i.e., switch 32 drops out in this variant).

Instead of the screw connection of the rear closure part 22 to handle 1, it would naturally also be possible to use a different releasable connection (for example, a plug-in connection, bayonet connection, etc.) and a corresponding configuration of the contact part that cooperates with the minus pole 35.

The closure part 22 could also have a shape quite different from that shown in the drawing. For example, the closure part could be equipped with a stop surface or foot part and thus serve as an element for mounting the toothbrush.

The toothbrush depicted in Figure 4 corresponds essentially to those of Figures 2 and 3; the same parts are again designated by the same reference numbers. According to Figure 4, the vibration device 10 is arranged directly in the front head part 3. The sleeve 20 drops out in this practical example; the battery 25 is connected directly to the vibration device 10 via lines 33, 34. A replaceable bristle carrier 5 that can be mounted on a neck part 2 of head part 3, for example in the fashion of a snap connection, is also preferably used in this toothbrush. The replaceability of the bristle carrier 5 provided with the bristle brushes 6 is of particular advantage, since the toothbrush equipped with vibration device 10 can be used regardless of the lifetime of the bristles, which is generally even less than the lifetime of the battery 25.

As is apparent in Figure 5, various other bristle carriers or adapters 5b to 5d can be mounted on neck part 2 instead of the bristle carrier 5 or 5a, which forms part of the conventional brush head and is provided with bristle brushes 6 and 6a, bristle carriers or adapters being provided with different interdental brushes 6b, 6c or interdental treatment part 6d for effective cleaning of the interdental spaces. The interdental brush 6b, for example, can be designed as a spiral brush made of coated wire with incorporated plastic filaments. The interdental brush 6c consists of bristles that together form a bundle tip. Treatment part 6d can be designed, for example, as a plastic element having a tip, which preferably can be provided with an abrasive coating to remove plaque and tartar in the interdental spaces. Any other treatment head could naturally also be used.

In the variants according to Figures 4 and 5, the bristle carrier 5 could also be configured so that a vibration-related movement relative to neck part 2 would be possible.

To introduce the vibration device 10, the connection line 33, 34 and other electronic components, the toothbrush according to the invention and its housing can be produced in two parts and the two parts welded together watertight after introduction of the parts just mentioned.

However, the toothbrush according to the invention can also preferably be produced in a two- or multicomponent injection molding process. The aforementioned parts are then advantageously inserted as a unit into an injection molded part made of a first material

component and then remolded with the second material component (or with additional material components). Complete remolding need not be involved. Certain parts can remain exposed so that an aesthetic effect can be produced.

However, the aforementioned electronic components could also be inserted into an already molded handle 1.

Owing to the fact that not only the vibration element 11, 11', but also the drive, i.e., the micromotor 15, are arranged in the front head part 3 or in the front region of the neck part 4 directly adjacent to it, no mechanical means of drive for connection of the micromotor to the vibration element 11 need be guided through the flexible neck part 4. Only the electrical lines 33, 34 (wires, cables or electrically conducting plastic tracks) run through the neck part 4.

A mechanical vibration device 10 is used according to the invention, which has a diameter of less than 15 mm, preferably less than 6 mm, and is less than 35 mm, preferably less than 20 mm long. This guarantees that the toothbrush can be configured ergonomically and is easy to handle. The toothbrush according to the invention corresponds in size roughly to an ordinary manual toothbrush, which means simpler handling in comparison with the significantly larger electric toothbrushes available on the market, but with this toothbrush a cleaning effect comparable to the known electric toothbrushes but milder relative to them is achieved. The toothbrush according to the invention is also simple to manufacture and cost-effective.

The vibration device according to the invention, however, could also be integrated in ordinary electric toothbrushes.

Claims

1. Toothbrush with a handle (1) and a bristle-carrying front head part (3), which are connected by a neck part (4), characterized by a mechanical vibration device (10) that vibrates the head part (3), which is accommodated in head part (3) or in a region adjacent to head part (3), which is effectively connected to an electrical power supply (25) accommodated in handle (1) via electrical connections (33, 34) running through neck part (4).
2. Toothbrush according to Claim 1, characterized by the fact that the vibration device (10) has a vibration element (11), which can be driven by a drive (15) electrically connectable to the power supply (25), which is arranged directly adjacent to vibration element (11) in head part (3) or in the region adjacent to head part (3).
3. Toothbrush according to Claim 1, characterized by the fact that the vibration device (10) has a vibration element (11') designed in the fashion of a vibration armature, which can be connected electrically directly to power supply (25) and is placed in vibration when power supply (25) is connected.
4. Toothbrush according to Claim 2, characterized by the fact that the vibration element (11) is designed as an eccentric mounted to rotate around an axis lying in the longitudinal direction of the toothbrush in a housing (12).
5. Toothbrush according to one of the Claims 1 to 4, characterized by the fact that vibration-damping means (7) are prescribed to prevent vibration transfer to handle (1).
6. Toothbrush according to Claim 5, characterized by the fact that the neck part (4) has vibration-damping neck part zone (7) made of an elastically compliant material in the region lying between vibration element (11 and 11') and handle (1).
7. Toothbrush according to one of the Claims 1 to 6, characterized by the fact that a replaceable battery (25) serves as power supply, which can be inserted into handle (1) and connected electrically directly to drive (15) or vibration element (11').
8. Toothbrush according to Claim 7, characterized by the fact that the battery (25) can be inserted into a sleeve (20) made of electrically conducting material arranged in a rearward open handle-cavity (21) that can be closed from the rear by a closure part (22).

9. Toothbrush according to Claim 8 or Claim 9, characterized by the fact that electrical connection of the battery pole (30) to drive (15) (or to vibration element 11' directly) occurs via a spring contact (29) and via lines (31, 33) leading from spring contact (29) to drive (15) (or to vibration element 11' directly) and electrical connection of the other battery pole (35) is produced via a part (22a) of closure part (22) in releasable connection with handle (1) and a line (34) connected to drive (15) (or to vibration element 11' directly), in which a switch (32) is provided to interrupt one of the two electrical connections.

10. Toothbrush according to Claim 9, characterized by the fact that the lines (31; 33) leading from spring contact (29) to drive (15) (or vibration element (11') directly) can be connected to each other via switch (32), in which switch (32) is incorporated in handle (1) and can be operated from the outside of handle (1).

11. Toothbrush according to Claim 9, characterized by the fact that the switch is integrated in closure part (22) and can be operated by rotating the closure part (22) that can be screwed into handle (1) or connected to it in bayonet fashion.

12. Toothbrush according to one of the Claims 1 to 11, characterized by the fact that the head part (3) has a neck part (2) on which a bristle carrier (5) provided with bristles can be replaceably mounted.

13. Toothbrush according to one of the Claims 1 to 12, characterized by the fact that the head part (3) is arranged moveable relative to neck part (4) and can be placed in movement relative to neck part (4) by vibrations generated by vibration device (10).

14. Toothbrush according to one of the Claims 1 to 13, characterized by the fact that vibration device (10) and the electronic components form a unit, which is intended to be inserted into a manufactured molded article made of the first material component in an injection molding process and to be at least partially remolded with at least one additional material component.

15. Toothbrush according to one of the Claims 1 to 13, characterized by the fact that the vibration device (10) and the electronic components form a unit intended to be accommodated between two separately produced toothbrush parts, which are connected, preferably welded together watertight.

16. Toothbrush according to one of the Claims 1 to 15, characterized by the fact that the mechanical vibration device (10) has a diameter of less than 15 mm, preferably less than 6 mm and is less than 35 mm, preferably less than 20 mm long.

//figs//

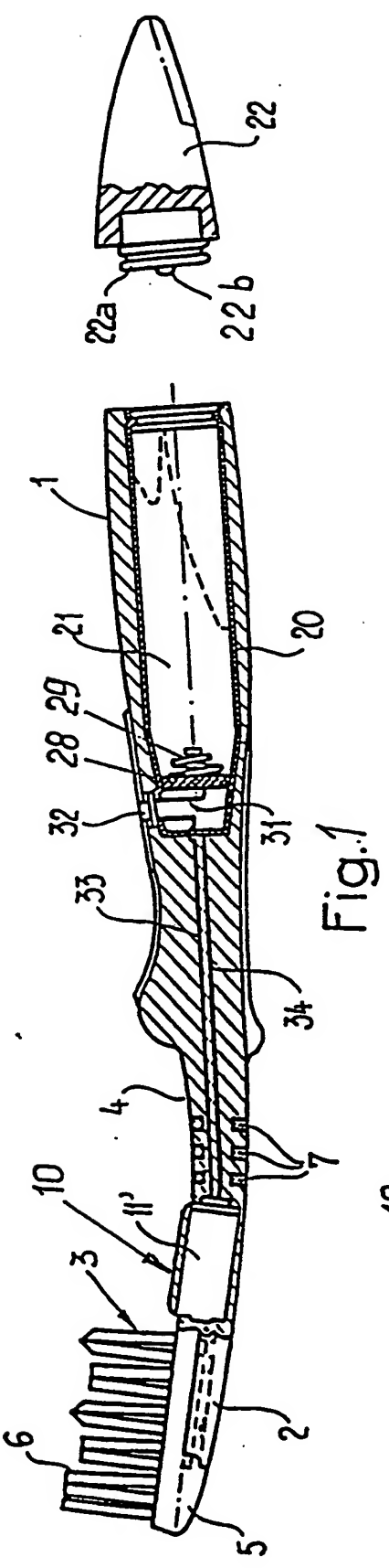

Fig. 1

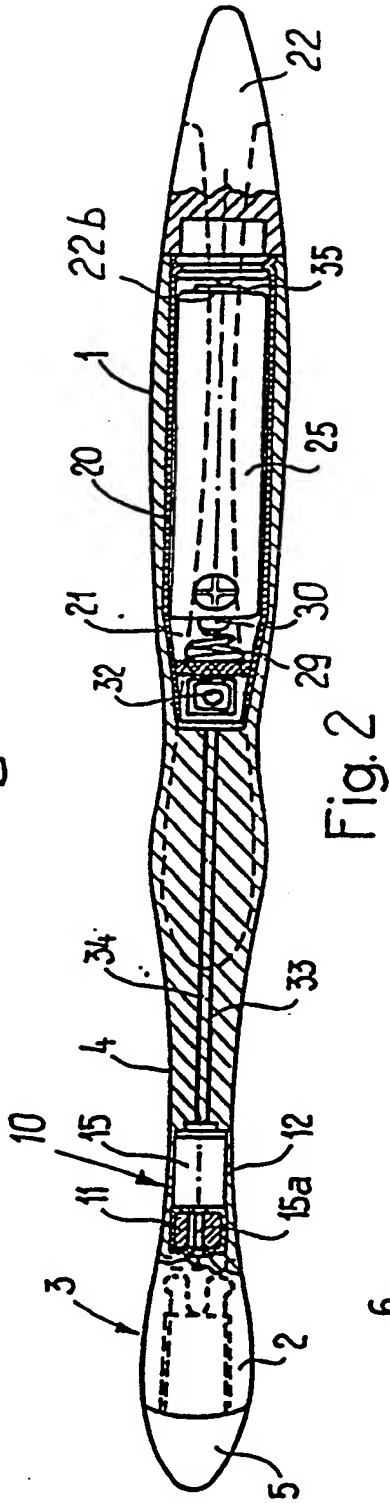

Fig. 2

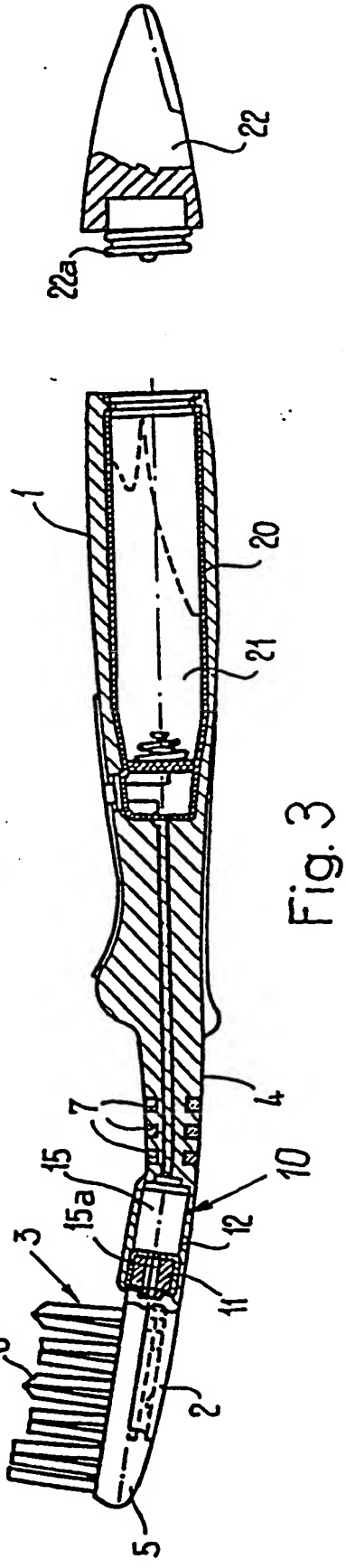

Fig. 3

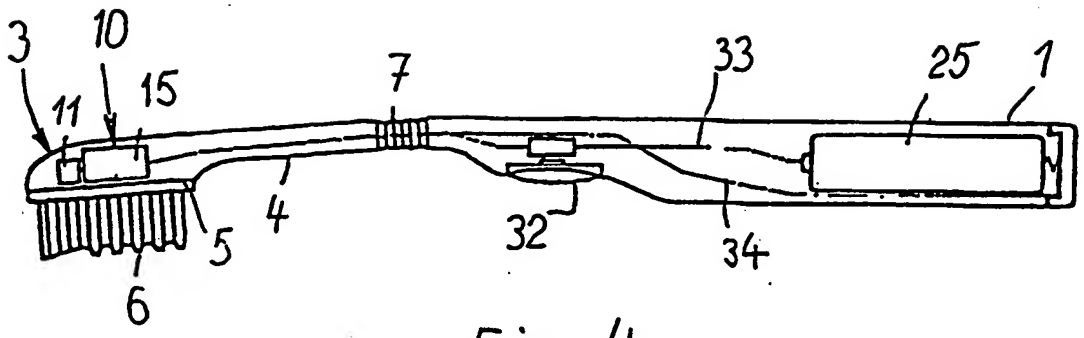

Fig. 4

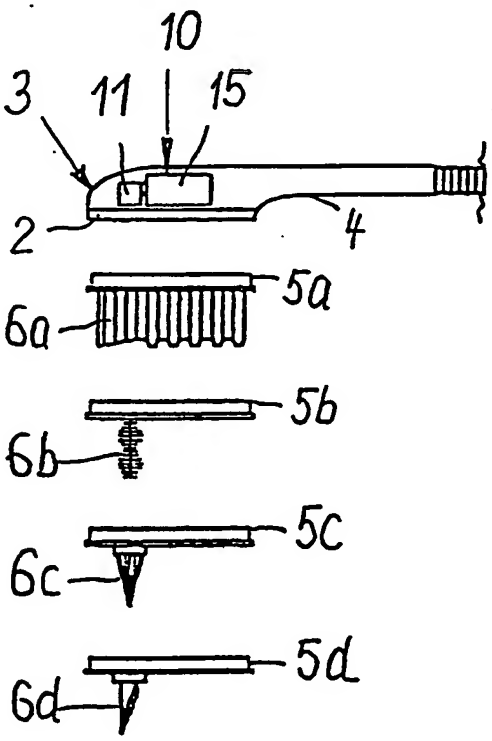

Fig. 5